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Improvement of Soil Physical Properties at B'lay Area in South Syria to Limit Land Degradation

H. Habib⁽¹⁾ and O. Al-Shihabi⁽²⁾

ABSTRACT

Land degradation deteriorates environmental systems and has direct and negative effects on crops yield, pastures and forests. Land degradation is an old phenomenon but in the last years it accelerated and spread widely to reach some interne areas in Syria like the studied area (Blay) which situated on the road of Damascus-Sowyda. In this paper morphological, physio-chemical, hydraulic and fertility study was done to clarify and define the reasons of this degradation in this specified area. Three land sections were done and morphologically described on site, soil samples were taken for analyses in the laboratory. Results showed that, the degradation may be related to different reasons like high apparent density which indicates the soil compacting, the low cation exchange capacity (CEC) and the low hydraulic conductivity with a low percentage of available water. Results also showed that the adding different percentage of soil conditioners, like hay, compost, polymer and manure ameliorates in different ratios the physical and hydraulic properties of soil.

Key words: Soil, Soil properties, Soil degradation, Morphology, Fertility, Available water, Soil additives.

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.(Dust storms)

² 46 %24 ² 11

) %59 ² 109000
.(2002

:
:
-1
-2

:

170-130

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.(Techno-export, 1962)

:

27 6

18-17

200-150

%55

:

150

:

:

:

2
(FAO, 1990)

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SCS (1972) NRCS (1996)

:

	.1:5	PH -1
.1:5	(EC)	-2
		-3
	O.M	-4
	0.5 N	
1		-5
.EDTA		:Ca ⁺² , Mg ⁺² ■
.Flame Photometer		:Na ⁺ , K ⁺ ■
:		-6
	(Cl ⁻ , HCO ₃ ⁻)	■
	(Ca ⁺² , Mg ⁺² , Na ⁺ , K ⁺)	■
	:	
		-1
		-2
105		-3

		A	-4
		(Darcy, 1856)	
		. 3	7
(3	7)		-5
		:	
		:	
	. 2		
	. %5	: 10	.a
	. 2		:
	. %1	: 2	.b
	. %2.5	: 5	.c
		:	
		. 2	
	. %2.5	: 5	.d
	. %5	: 10	.e
	(PAM) Polyacrylamide		:
%2000			
	. %0.1	: 0.2	.f
	. %0.25	: 0.5	.g
		:	
	B A		-6
		(Rifat Bulut <i>et al.</i> , 2001)	
		:	
7.5 YR			
	7.5 YR 3/4		4/6
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(Nodules)

20
%10 50-22
1

.()

2>

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(%50)

.(Soil survey manual, 1993) (1)

.(...
3 / 1.5 1.3)

%12-6

(1)

	%	%	%	%	³ /	()	
	21.3	51.1	27.6	6.0	1.51	10 - 0	
	41.3	47.0	11.7	8.0	1.51	22 - 10	
	40.3	46.8	12.9	8.6	1.48	50 - 22	
	38.5	43.5	18.0	12.1	1.40	90 - 50	
	23.2	49.3	27.5	7.2	1.30	7 - 0	
	42.1	45.0	12.9	10.0	1.37	18 - 7	
	41.0	47.3	11.7	8.4	1.26	55 - 18	
	36.9	44.7	18.4	10.8	1.45	80 - 55	
	22.7	48.3	29.0	6.4	0.97	30 - 0	
	40.1	48.1	11.9	9.1	1.50	60 - 30	
	39.8	44.7	15.5	7.9	1.50	90 - 60	
	39.3	45.2	15.5	8.5	1.50	120 - 90	

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pH=8.3
De Coninck)

pH (3 2)

(1978, Tan 1998

(/ 0.195 EC)

/ 1.7 EC

%1

%0.5

14.40 - 8.07

(%40)

(Buol *et al.*, 1997)

/ 6

(2)

					%	CaCO ₃ %	EC dS/m	PH	()
	K ⁺	Na ⁺	Mg ⁺⁺	Ca ⁺⁺					
100/	100/	100/	100/	100/					
12.22	1.10	0.12	3.50	7.50	1.03	27.8	0.195	8.3	10-0
11.42	0.44	0.48	2.75	7.75	0.39	30.0	0.260	8.15	22-10
11.14	0.26	1.38	1.25	8.25	0.52	28.0	1.760	8.25	50-22
11.36	0.25	1.36	1.00	8.75	0.52	28.0	1.475	8.25	90-50
11.73	1.00	0.48	3.00	7.25	0.72	30.0	0.180	8.3	7-0
12.18	1.00	0.43	2.75	8.00	0.62	30.0	0.180	8.3	18-7
12.79	0.83	0.71	3.50	7.75	0.52	30.0	0.570	8.2	55-18
12.32	0.69	0.38	3.25	8.00	0.36	29.0	1.100	8.2	80-55
11.33	1.00	0.33	2.50	7.50	0.57	28.6	0.185	8.35	30-0
14.40	1.20	0.24	6.52	3.22	0.41	28.6	0.630	8.35	60-30
11.07	0.64	0.93	5.50	4.00	0.46	33.6	0.650	8.3	90-60
8.07	1.00	1.32	2.75	3.00	0.67	55.0	0.346	8.4	120-90

() (3)

Cl ⁻	HCO ₃ ⁻						()
			K ⁺	Na ⁺	Mg ⁺⁺	Ca ⁺⁺	
100/	100/	100/	100/	100/	100/	100/	
0.80	1.3	1.55	0.06	0.42	0.30	0.95	10 - 0
0.96	1.1	2.81	0.04	0.37	0.10	0.75	22 - 10
1.60	0.9	3.92	0.03	1.39	1.25	1.25	50 - 22
4.80	1.2	2.45	0.03	1.42	0.45	0.45	90 - 50
0.24	1.6	1.93	0.04	0.24	0.70	0.95	7 - 0
0.28	1.1	2.86	0.02	1.74	0.45	0.65	18 - 7
1.82	1.5	1.93	0.06	0.87	0.30	0.70	55 - 18
4.72	1.3	2.56	0.02	1.54	0.60	0.40	80 - 55
0.12	1.4	2.06	0.04	0.32	1.10	0.60	30 - 0
1.38	1.0	3.27	0.02	1.65	0.75	0.85	60 - 30
2.00	0.9	3.40	0.03	1.26	1.00	0.75	90 - 60
0.98	1.0	3.24	0.02	1.57	1.00	0.65	120 - 90

Soil Classification :

USDA 2010 USDA 1999

:

Ochric :

:

Calcic horizon

(Van Ranst,1991)

50-22

20

10

%5

:

50-22

Ck B12k, B1k, A1k, Ap

Haplocalcids

Calcids

Aridisols

.Typic Haplocalcids

:

9.64E-03 5.35E-04 (A)

(4)

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.(1)

(Soil Water Characteristics, V6)

10.9

%1094

%2.5

7.7

%5

%0.25

(%0.1)

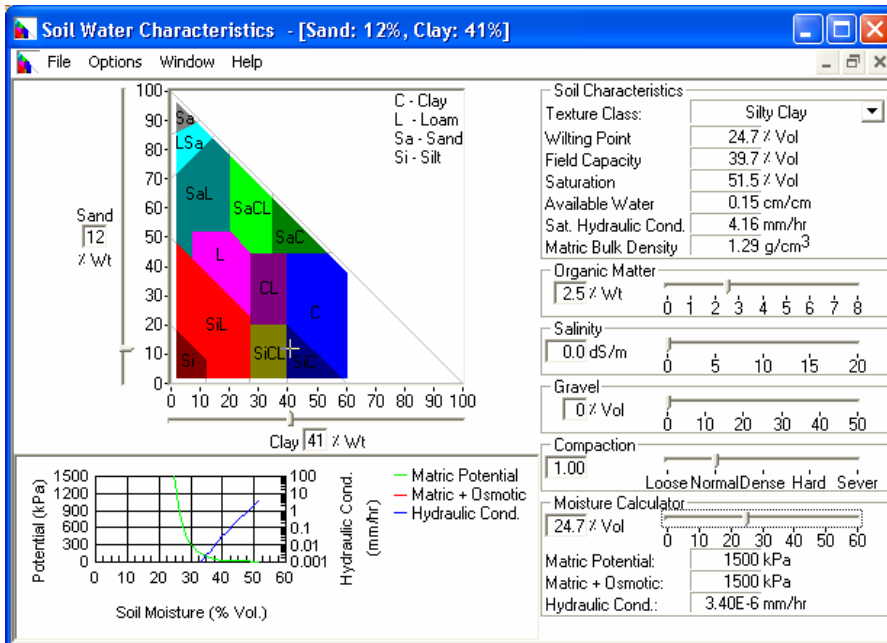
%5

(3 2)
 .(aggregates)

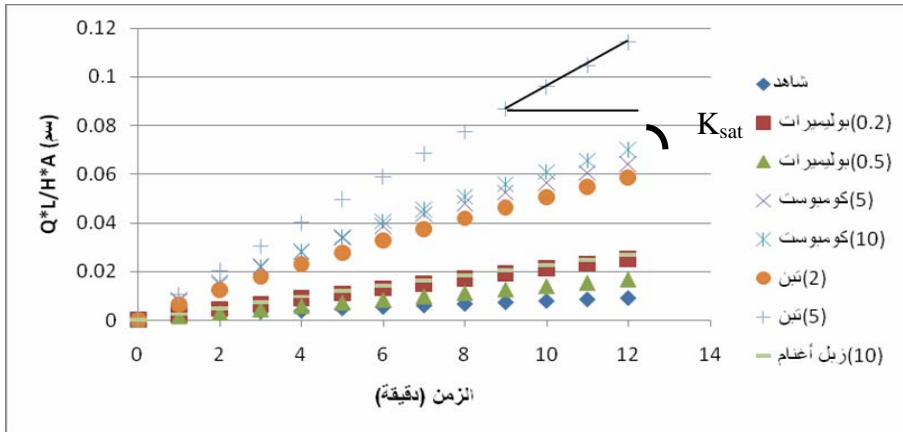
2.8

(4)

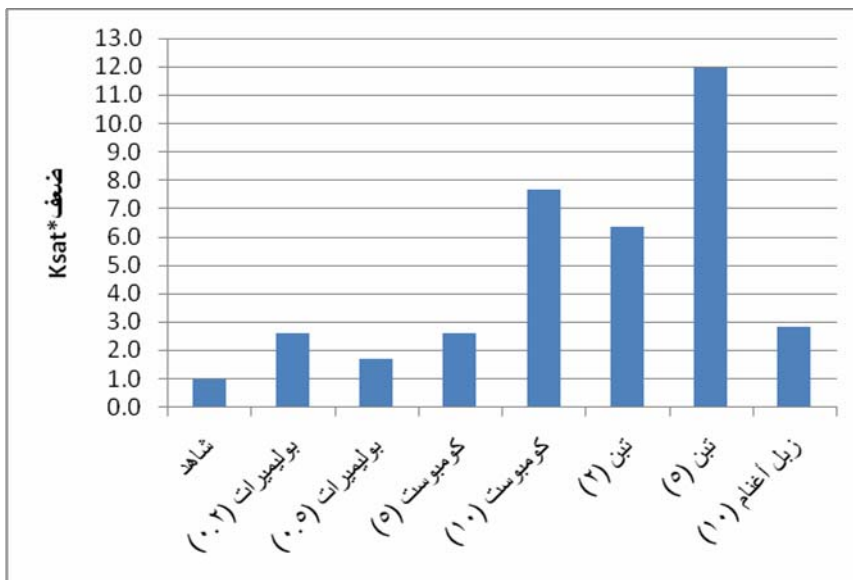
(K*)	(%K)	K _{sat}		
		/	/	
1.0	0	1.94E-02	8.07E-04	
2.6	163	5.09E-02	2.12E-03	%0.1
1.7	72	3.34E-02	1.39E-03	%0.25
2.6	163	5.09E-02	2.12E-03	%2.5
7.7	668	1.49E-01	6.20E-03	%5
6.4	535	1.23E-01	5.13E-03	%1
.901	1094	2.31E-01	9.64E-03	%2.5
2.8	185	5.52E-02	2.30E-03	%5



(Soil Water Characteristics, V6) (B, A) (1)



(2)



(3)

(B, A)

(Rifat Bulut *et al.*, 2001)

1/3

15

(log(kPa)=1.5
(1992) (log(kPa)=3

(4)

(log(kPa)=3)
%9

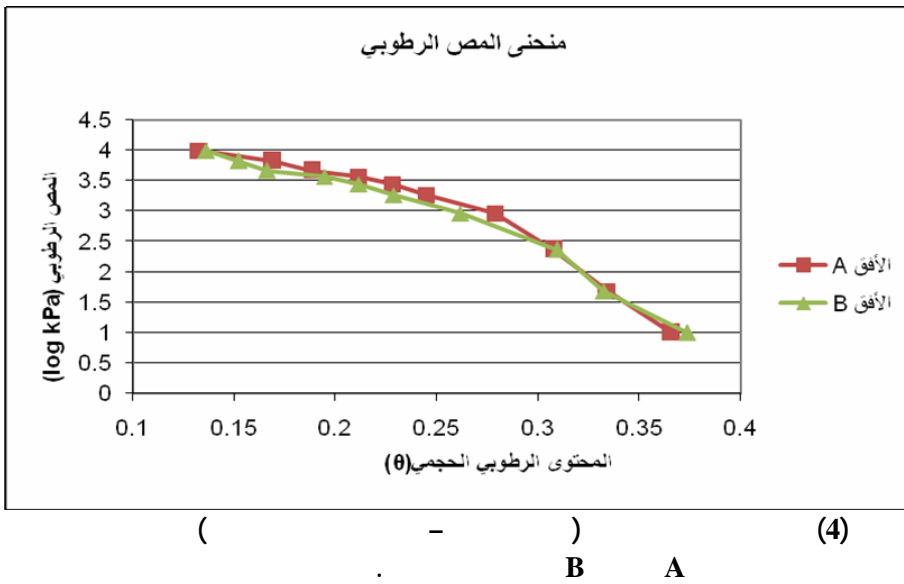
%33
%12

(log(kPa)=1.5)
%25

%16
3 / 1.5

(Soil Water Characteristics, V6)

.1 B A



pH .

%40

()

12

8

200

REFERENCES

.(1992) .

.(2002) .

- Buol, S. W., F. D. Hole, R. J. Mc-Cracken, and R. J. Southard. (1997). Soil genesis and classification, 4th edition, Iowa state univ. Press.
- Darcy, H. (1856). Les fonctions publiques de la ville de Dijon, Dalmont, Paris.
- De coninck, F. (1978). Physico-chemical aspects of pedogenesis I.T.C, state univ. of Ghent, Belgium, 136 p.
- FAO, ISRIC. (1990). Guidelines for soil description, 3^{ed} edition, Rome, Italy, 70 p.
- NRCS. (1996). Soil survey lab. Methods manual, soil survey investigation report No. 42, version 3.0 USDA.
- Rifat Bulut, M. ASCE, Robert L. Lytton, F. ASCE, and Warren K. Wray, F.ASCE. (2001). " Soil Suction Measurements by Filter Paper," *Proceedings of Geo-Institute Shallow Foundation and Soil Properties Committee Sessions at the ASCE 2001 Civil Engineering Conference*, pp. 234-261.
- SCS. (1972). Soil survey lab. Methods, and procedure for collecting soil samples, US. Govern. Printing Office, Report No. 1:63p.
- Soil Survey Manual. (1993). Soil Conservation Service. U.S. Department of Agriculture, Handbook 18.
- Soil Water Characteristics, Version 6, Software, USDA, Agriculture Research Service, <http://hydrolab.arsusda.gov/soilwater/Index.htm>
- Tan, H. K. (1998). Principles of soil chemistry, univ. of George Athenes, Georgia, Marcel Dekker, Inc.
- Techno-export. (1962). Geological Map of Syria. Ministry of Industry, Syria, 111p.
- USDA. (1999). Soil Survey Staff, a basic system of soil classification for making and interpreting soil survey, 2^{end} edition.
- USDA. (2010). Soil Survey Staff, Key to Soil Taxonomy, 11th edition, NRCS, USDA.
- Van Ranst E. (1991). Concept of soil development, formation of diagnostic horizons and material. State univ. of Ghent, Belgium, 172 p.

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